

# 2024 NFLPA Case Competition

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The 2020 NFL Collective Bargaining Agreement (CBA) represents a shift in the league's approach to player compensation by introducing measures such as expanded rosters, increased revenue sharing, and higher minimum salaries for younger players. However, these changes have disproportionately benefited elite players and rookies, leaving middle-class players and their earning potential increasingly constrained. This paper aims to identify the middle class issue, provide justification for why this issue exists, offer a potential solution in the form of a Veteran Salary Exemption, and present the Contract Forecasting Tool, an algorithm that uses statistics to project player contracts.

NFL | NFLPA | Football | Analytics

The National Football League's middle class is composed of athletes whose contracts fall between capable starters and quality backups. These middle-class players bring a wealth of knowledge and experience to their teams, but lack the marketability and status required to secure top-tier compensation.

Key factors defining this group of players include positional value, contract length, and guaranteed money. Unfortunately, the league-wide trend of preferring younger and cheaper players has placed the middle class at risk.

Prior to the 2011 CBA, rookies were able to negotiate the length and value of their first contracts. The 2011 CBA introduced a rookie wage scale, which significantly reduced the contract cost. Since teams often draft players with high upside and redirect a large portion of their salary caps to star players, the middle class has suffered.

The NFL's hard salary cap structure has compounded this issue, which is highlighted by drawing comparisons between the NFL and Major League Baseball (MLB). The MLB uses a luxury tax system rather than a hard salary cap, allowing teams to spend above a certain threshold with financial repercussions rather than outright restrictions. MLB players, who often have longer careers—5.6 years on average compared to the NFL's 3.3 years—also have more opportunities to secure contracts. Additionally, a large number of MLB contracts are fully guaranteed, which provides stability for players (1)(2). There seems to be a problem with the current state of the middle class. Is it possible to diagnose and solve this issue? We believe our paper might hold the answer.

## Determining the middle class

Before diving into our analysis, it was essential to first define what it means to be part of the middle class and gather the necessary data to support our evaluation.

**Initial data wrangling.** To begin, we scraped contract data from **Over The Cap** at each position from 2016 to 2024 (3). While we were instructed to examine contracts from the past decade, a significant amount of data was missing before 2016. Regardless, the chosen time period would provide substantial context to the contracts before and after the 2020 CBA. The actual data included the name of the player, the team that signed him, and the details of the contract (year, APY, guaranteed money, etc.). We were particularly interested in the Average Per Year as a Percent of the Total Cap Space at the Time of Signing (**APYPTOS**) as it neutralizes the effect of inflation and allows for a more accurate comparison. This statistic and acronym will be used frequently in the paper.

Next, players on rookie contracts were removed. To do this, we acquired draft data from **Pro Football Reference**, adding draft information to every player's name in the contract dataset (4). If the player was drafted in the same year that they were given a contract, then the contract they were given was indeed a rookie contract.

Lastly, players on veteran minimum contracts were removed. After all, if a player is on a minimum contract, it is likely that they have little bargaining power and are not part of the middle class (6).

## Significance Statement

Since 2016, the NFL's middle class has steadily eroded, leaving a widening gap in player compensation across nearly every position. Our paper introduces two groundbreaking solutions to reverse this troubling trend. First, we propose the **Veteran Salary Exemption (VSE)**—an innovative, salary cap-exempt mechanism designed to incentivize teams to retain and invest in mid-level veteran talent. Second, we unveil the **Contract Forecasting Tool**—a cutting-edge predictive algorithm that projects a player's future contract based on their age and statistics. This unbiased model can provide players with a data-driven negotiating tool, leveling the playing field in contract discussions. Together, these tools offer a transformative framework to sustainably rejuvenate the middle class while championing fairness and opportunity for players in today's system. It will take a substantial amount of resources to address the diminishing middle class, and we believe our solutions can make a big leap towards solving the issue. [Link to GitHub](#)

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**Defining the middle class.** What constitutes the middle class? We came up with two definitions.

**Definition one.** For this definition, we operated under the assumption that players on veteran minimum contracts are in the lower class. Since these players were removed, the dataset consisted exclusively of players in the middle and upper classes. To objectively split the contracts into two groups, we used an unsupervised learning technique called K-means Clustering. Technically speaking, this machine learning method categorizes data points into a predefined number of clusters (k) by minimizing the within-cluster variance (5). In other words, the algorithm will split the values in a dataset into groups based on their proximity to each other. In this case, the goal was to split the player contracts into two based on their APYPTOS. We ran the algorithm year-by-year for every position. It was now possible to determine which players belonged in the middle class group and which players belonged in the upper class group for any given year at any given position.

While this was a good start, we noticed that the distribution of contract values fluctuates annually. For example, in 2024, eight wide receivers received contracts with an APYPTOS exceeding 10 (more than 25 million dollars a year). In 2023, however, the most expensive wide receiver contract had an APYPTOS of just 6.7. Why is this an issue? For a given year, the model assumes that the player with the highest APYPTOS is the most expensive player even if they are making significantly less than others in different years. The algorithm's goal is to maintain a similar ratio between the two groups. Because of this, the definition of the middle class *varies* every year. If we are trying to decide whether the middle class has expanded or contracted, the definition of the middle class needs to **stay the same** throughout those 10 years. This definition needs to be revised.

**Definition two.** For the second definition, we decided to take a more qualitative approach. The goal was to define the middle class based on a fixed APYPTOS interval that would vary by position. We used APYPTOS to determine the range of middle class contracts, while also considering a few other qualitative and quantitative factors. The following factors were taken into account:

- **Number of years on contract** - We expect upper class contracts to be more than two years and middle class contracts to be two years or less.
- **Number of other contracts with similar value** - This is especially true for lower valued contracts. If many players receive the same contract, the value might have been set beforehand and little negotiation was done. This is an indication of how much bargaining capital a player has.
- **Amount of guaranteed money** - Upper class contracts tend to have more guaranteed money
- **Player pedigree** - Starters and important franchise pieces tend to be paid upper class-level money.

If there were significant drop-offs in any of the above factors, it could indicate a transition from the upper class to the middle class. We also took the splits from *definition one* into account. Based on our analysis, we were able to determine a upper and lower bound for the middle class at each position. The lower bound **remained the same** at an APYPTOS of 0.7 (a veteran minimum contract has an APYPTOS of 0.4). The overall salary range is listed in **Table 1**.

Position	APYPTOS range
Quarterback	0.7 - 10
Running back	0.7 - 2
Wide Receiver	0.7 - 5
Tight End	0.7 - 2.5
Offensive Tackle	0.7 - 4
Offensive Guard	0.7 - 3.5
Center	0.7 - 2
Edge Rusher	0.7 - 5
Interior Defensive Lineman	0.7 - 4.5
Linebacker	0.7 - 2
Cornerback	0.7 - 3.5
Safety	0.7 - 2

**Table 1. Middle class salary range at every position.**

Quarterback has by far the largest upper bound whereas positions like running back, safety, linebacker, and center have the lowest upper bound. This seems to pass the eye test. We decided to adopt this second definition for our analysis.

Analyzing the behavior of the middle class over time

To analyze whether the NFL’s middle class has grown or contracted over the past 8 years, we first split the data up by position and mapped the percentage of middle class contracts over time. It is worth noting this percentage **excludes** veteran minimums, as mentioned before. The *middle class percent* should be interpreted as the percentage of middle class contracts among all non-minimum contracts. The following subsections examine how the middle class has changed over time at every position.

**QB.** The most fluctuating changes in the middle class were at the quarterback (QB) position, as shown in **Figure 1**.



**Fig. 1.** Middle class contracts by year - Quarterback

The percentage of middle class contracts at quarterback dipped significantly in 2020, falling **below 50 percent**, but then **rocketed up to 70 percent** in 2021. This trend could be explained by COVID, which affected those two seasons, or by the 2020 CBA, which caused shifts in contract negotiations. However, this could also just be a result of not having many new quarterback contracts each year. With small samples comes large fluctuations. It is hard to draw a definitive conclusion about the changes in the QB middle class, although visually the graph appears to trend downward, implying that the middle class may be **shrinking slightly**.

**WR/RB/TE.** Next, we compared the main offensive ball carrier positions: running back (RB), wide receiver (WR), and tight end (TE). The results are shown in **Figure 2**.

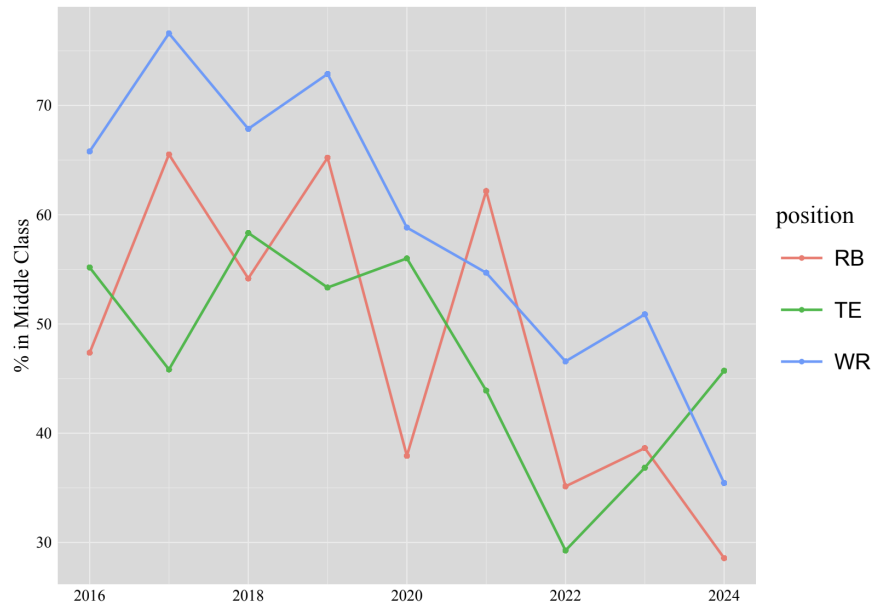


Fig. 2. Middle class contracts by year - Running back/Wide receiver/Tight end

There seems to be a conclusive shrinking of the middle class at all three positions. With wide receivers especially, the percentage of middle-class contracts hovered around **70 percent** from 2016 to 2019, but has plummeted since, falling almost to **35 percent** in 2024. This coincides with the 2020 CBA agreement. Tight ends have **rebounded** since their low in 2022, suggesting that the middle class may be stabilizing, but running backs have had their middle-class percentage continue to drop, reaching a **sub-30 percent** low in 2024.

**OL.** Offensive line contracts also appear to have shrinking middle classes, as visualized in **Figure 3**.

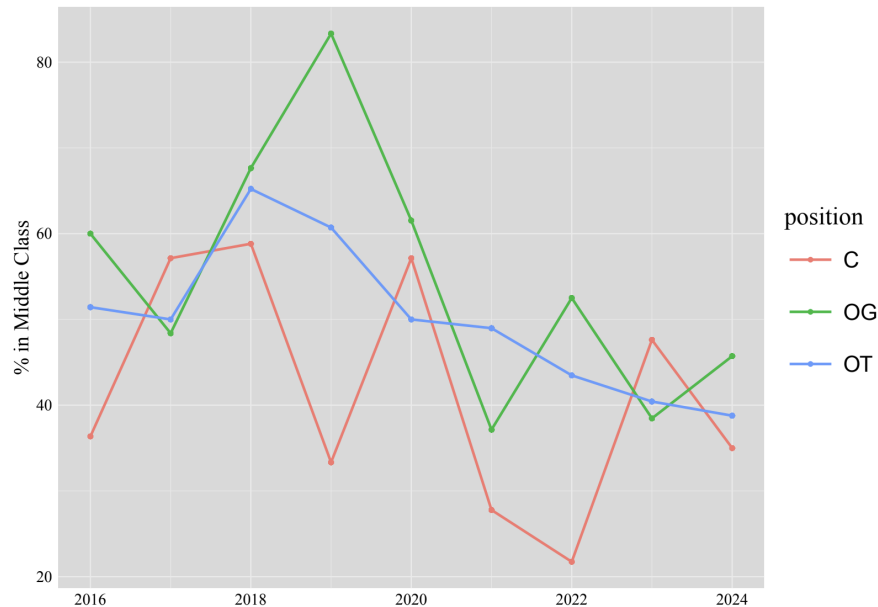


Fig. 3. Middle class contracts by year - Offensive line

Offensive tackles have followed a particularly gradual trend, while centers and offensive guards have seen larger fluctuations, while still with an overall downward slope. In 2020, all offensive line positions had middle-class percentages of **at least 50 percent**. In the four years since, all percentages have been **below 50 percent** apart from a small bump in OG middle-class contracts in 2022.

**EDGE/IDL.** For the defensive analysis, we began by examining interior defensive linemen (IDL) and edge rushers (EDGE), as detailed in **Figure 4**.

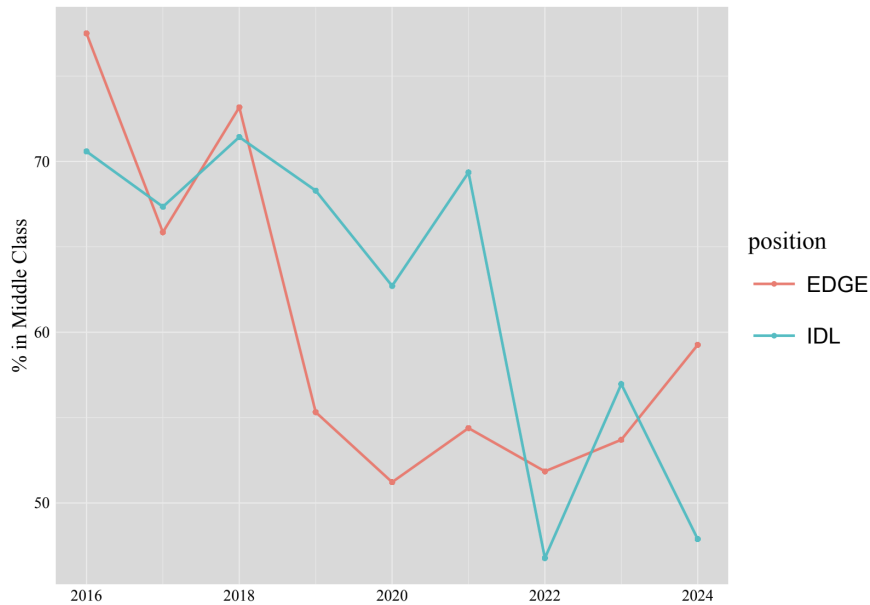


Fig. 4. Middle class contracts by year - Defensive line

Once again, these positions show a notable decline in the percentage of middle-class contracts, though the middle class percentages still tend to hover above 50 percent. As a result, the shrinking of the middle class for the defensive line appears to not be as intense. Interestingly enough, the decline in the middle class for these positions **began in 2019**, before the 2020 CBA, suggesting that other factors could explain the shrinking.

**LB/CB/SAF.** Lastly, we looked at cornerbacks (CB), safeties (SAF), and linebackers (LB), shown in **Figure 5**.

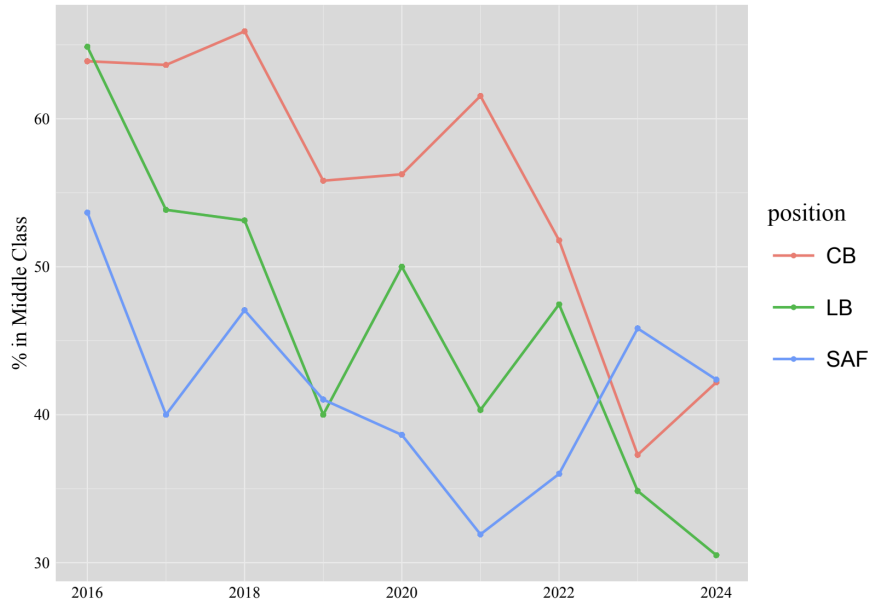


Fig. 5. Middle class contracts by year - Linebacker/Cornerback/Safety

Unsurprisingly, the general trend once again shows the middle class shrinking. Cornerbacks have seen a sharp fall post-2020, while linebackers have seen their middle class shrinking starting from 2016, and all the way up to 2024. Safeties started with the lowest middle-class percentages, but have actually seen some gains since 2021. They have the least significant middle-class shrinkage of the three.

**Bringing it all together.** After completing the positional analysis, we combined all positions into **Figure 6**, showing the overall change in percentage of middle-class contracts over the past eight years.

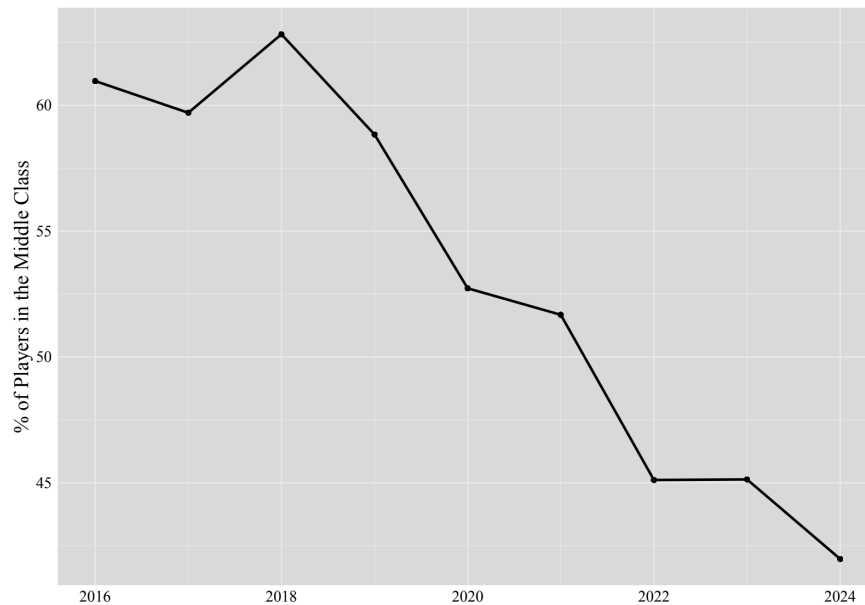


Fig. 6. Middle class contracts over time - All positions

The conclusion is quite clear. The NFL middle class remained relatively stable from 2016 to 2019, at about 60 percent of players, peaking in 2018. But since 2020, it has shrunk significantly. In the 2024 season, only about 42 percent of all (non-minimum) contracts signed fell into the middle class. There are simply fewer players being paid middle-class money right now, and the trend shows no indication of reversing. Thus our goals were set: theorize why the middle class is shrinking, assess the consequences of this decline, and come up with solutions with the potential to halt or reverse the trend.

### Why is the middle class shrinking?

Two main factors can explain the behavior of the middle class: rookie contracts and elite player contracts.

**Rookie contracts.** Rookies are desirable for two main reasons: their age and their cheap contracts. The average age of a draft class ranges from around 22-24 while the average age of the entire NFL (rookies included) is nearly 26.5 years (7). Rookies have the advantage of having fresher legs and less wear and tear compared to their veteran counterparts. Not only are rookies less prone to injury, but they are also paid substantially less. In 2025, players drafted in the third round and later earn less than 6.5 million dollars over their first four years, and undrafted rookies get paid as little as the league minimum (8). Moreover, teams are able to get high-level production out of their rookies, especially recently. Seen with the San Francisco 49ers and Brock Purdy, the quarterback's cheap contract has allowed the 49ers to spend elsewhere and extend their contention window (9). The luxury to rely on cheap rookies to fill in weaknesses has certainly contributed to the decline of the middle class.

**Elite players.** Teams would rather pay few elite players than several middle class players. After all, elite players provide significant advantages to their teams. Players such as Patrick Mahomes and Justin Jefferson can win games almost single-handedly. And instead of investing in middle class players, teams believe they can "fill in the gaps" around elite players with role players or young talent and choose to heavily invest in top talent.

**The 2020 CBA.** While largely beneficial, the 2020 CBA introduced several changes that may have unintentionally contributed to the contraction of the NFL's middle class. One of the most significant changes was increased revenue sharing, guaranteeing players 48 percent of the league revenue (10). This higher revenue pool has been largely directed toward top-tier players, allowing teams to offer record-breaking contracts to elite talent. However, this prioritization has left fewer financial resources for mid-level earners.

Additionally, the CBA mandated expanded rosters, increasing team sizes to 55 players (11). This change coincided with a rise in minimum salary floors for younger players, making it more economical for teams to fill roster spots with low-cost, entry-level talent instead of mid-tier veterans. With limited cap space, organizations are incentivized to allocate funds to superstar contracts while supplementing their rosters with rookie deals and veteran minimums, further marginalizing mid-level players.

This shift in resource allocation underscores how the CBA, despite its intention to provide broader financial security, has inadvertently amplified the disparity between the league's highest earners and those in the middle class.

## Solution: The Veteran Salary Exemption

The proposed solution to the NFL's contracting middle class is to create a **Veteran Salary Exception**, modeled after the NBA's Mid-Level Exception (MLE) (12). This system would allow NFL teams to sign mid-level veterans to contracts without hurting their current salary cap. It would function as a mechanism where teams borrow money in the present and pay it back in the future. This would give teams a no-immediate-cost incentive to sign mid-level players.

The following subsections provide more detail and structure into this proposed solution.

**A. Purpose.** The Veteran Salary Exception (VSE) is established to enhance competitive balance and preserve opportunities for mid-level players by incentivizing teams to sign these veterans through a salary cap-exempt mechanism.

**B. Cap Exemption.** Under this exception:

1. The **maximum** compensation offered to an eligible player shall not exceed the average of the upper and lower bounds of the middle class for the player's position as defined in the previous section.
  - Example: the lower bound for a QB is an APYPTOS of 0.7. The upper bound is 10. The maximum salary would have an APYPTOS of  $(10+0.7)/2 = 5.35$ . This would be around 13.66 million dollars in 2024.
2. Contracts **may not** exceed two years.
3. There will be no added roster spots as a result of this proposition.
4. Teams may only opt for a VSE **once a season**.
5. The contract will go against the team's salary cap **the following year**.
  - If a player signs a 1 year 5 million dollar contract in 2025, for example, the team will have 5 million dollars less to work with in 2026.
  - If a player signs a 2 year 10 million dollar contract in 2025, the team will have 10 million dollars less to work with in 2026.
  - If a team chooses to move on from a player on a multi-year contract **after** year one, the team would still owe the player's entire salary the following year.
  - There is a possibility for teams to stretch the money they owe across multiple years. However, the money should be paid **within five years** of the contract being signed.
6. VSE contracts are **fully guaranteed**. Teams will not save cap space by cutting these players.
7. While VSE contracts cannot exceed two years, a team may be allowed to designate **the first one or two years** of a long-term contract under the VSE (granted the player is eligible).
8. A VSE may be used **mid-season**.

**C. Eligibility criteria.** To qualify for the VSE:

1. The player must have a minimum of four (4) accrued seasons in the NFL.
2. The player must have earned **less** than the middle class upper limit in the previous year. In other words, the player must have previously been middle or lower class.

**D. Funding source.** The cap-exempt portion of VSE contracts will be funded through the NFL's league revenue pool, which consists of contributions from league-wide shared revenues (media deals, merchandising, etc.). These funds will be set aside and teams have the option to borrow from the pool knowing that the money will count against their cap in the following year. This funding strategy ensures that the VSE won't be dominated by big-market teams with owners willing to subsidize. This approach also avoids imposing additional financial burdens on teams or altering the salary cap structure, ensuring minimal disruption to the league's current operations. By reallocating a small portion of these collective revenues, the NFL can fund the cap-exempt portion of VSE contracts without affecting competitive balance or team finances. Our solution for funding is self-correcting. While teams borrow initial money, it will be paid back in full through future salary cap space. Here are a few more caveats to the funding method:

- A team can borrow a **maximum** sum of money equivalent to **four percent** of the projected salary cap for VSE contracts.
- Enough money will be set aside for every team to theoretically be able to fund the maximum VSE contract.
- Any unused money will be **retired** to the general revenue pool for the next season.



## E. Limitations.

1. A team may not designate more than one (1) player under the VSE per season, with a maximum of two players under the VSE at a given time (one from the previous season, and one from the current season).
2. The exception may not be used for players who are already under contract.

**F. Administration and Review.** The NFL Management Council and NFL Players Association shall jointly monitor the implementation and effectiveness of the VSE and may amend the terms as necessary through mutual agreement during the duration of the Collective Bargaining Agreement.

## G. Expected outcomes.

1. **Revitalize the middle class:** The VSE will create a specific pathway for teams to sign mid-level veterans who currently struggle to find opportunities due to cap constraints. By partially exempting their salaries from the cap, the VSE allows teams to invest in these players without sacrificing their ability to acquire rookies or retain star contracts. Over time, this will help rebuild a robust middle class of players who bring consistency and experience, creating a more balanced distribution of talent across the league.
2. **Increase competitiveness:** Contenders looking to add more and fringe playoff teams looking to establish themselves would benefit the most from the VSE. This would increase a flood of talent into the NFL, allowing for higher quality games.
3. **Enhance team depth and leadership:** Teams relying heavily on rookie contracts and top-tier players often lack depth and veteran presence, which are critical for navigating the physical and strategic challenges of an NFL season. The VSE provides an incentive to retain experienced players who can mentor younger teammates, stabilize locker rooms, and contribute during crucial moments. This depth and leadership improve the overall quality of play and reduce the likelihood of teams faltering due to injuries or inexperience.
4. **Boost veteran career and longevity:** Players with 4-8 years of experience often face an abrupt end to their careers as teams prioritize younger, cheaper talent or high-profile stars. The VSE will create a renewed market for this overlooked demographic, offering them financial security and extended opportunities to prove their value. This not only lengthens their careers but also strengthens the league's reputation as a supporter of player development and longevity.
5. **Strengthen Player-management relations:** Implementing the VSE would demonstrate the NFL's commitment to addressing systemic challenges faced by mid-level players, sending a strong message of support to the Players Association. By proactively ensuring career opportunities for veterans, the league builds goodwill and trust among players, reducing potential conflicts and fostering a stronger partnership between players and management. This collaborative approach could also pave the way for smoother negotiations in future collective bargaining agreements.

By redistributing resources strategically to support mid-level veterans, the VSE aims to balance player retention, team performance, and financial sustainability. Its implementation would strengthen the league's ecosystem, providing long-term benefits for players, teams, and fans alike.

## Application: Contract Forecasting Tool (CFT)

Is it possible to predict how much a player will earn based on their statistics from previous seasons? To answer this question, the Contract Forecasting Tool (CFT) was created. Through Pro Football Reference, we took player single-season statistics at each position from 2014 to 2024 and combined them with the contract data. We then used an Extreme Gradient Boosting (XGBoost) algorithm with the goal of predicting a player's APYPTOS based on age and the statistics we chose.

**Player statistics.** Which player statistics were taken? And which have the largest effect on a player's contract? We chose a total of five statistics at every position. Of these five, three were universal (apply to every position). This includes games started, snap percentage (per game), and *Approximate Value* (AV). AV is a Pro Football Reference statistic that uses statistics, accolades, and positional weight to determine how valuable a player's season was (13). As such, all three of these stats are comparable across positions. Pro Football Reference did not have any specific statistics for offensive linemen. For all other positions, **Table 2** details the additional statistics we chose.



Position	Stat 1	Stat 2
Quarterback	TD/(INT + 1)	Passer rating
Running back	Scrimmage yards	Yards per attempt
Wide Receiver	Scrimmage yards	Yards per target
Tight End	Scrimmage yards	Yards per target
Edge Rusher	Sacks	Solo tackles
Interior Defensive Lineman	Sacks	Solo tackles
Linebacker	Solo tackles	Passes defended
Cornerback	Solo tackles	Passes defended
Safety	Solo tackles	Passes defended

Table 2. Position-specific statistics

We could have used advanced statistics such as yards per route run and pass rush win rate. However, these were not available on Pro Football Reference before 2016 and the statistics we chose are probably brought up when negotiating contracts.

A player’s two seasons prior to their contract year are the most important in determining their salary. The player’s most recent season would hold a weight of 0.66 while the previous year would be valued at 0.33. For example, if a player was up for a contract in 2016, all of their 2015 statistics would hold a weight of 0.66 and 2014 would hold a weight of 0.33 (6).

**Preparing the model.** We decided to create two models: one for offensive linemen and one for all other positions, since the former had less parameters. In order to combine positions, we needed to standardize the statistics, since different statistics have different units. We decided to apply an empirical cumulative distribution function (14) for every position-specific statistic. This would give the percentile of a player compared to the others in their position.

All positions were combined according to their respective models and split into training and testing groups (80/20). Player position and age were also included as factors in the model. The statistics, age, and position were all variables that were used to predict a player’s APYPTOS.

**Model results.** How did our model perform? **Figure 7** compares the player’s predicted APYPTOS to how their actual APYPTOS. Since there was over 3000 contracts, we chose to visualize a random sample of 500 for aesthetic purposes.

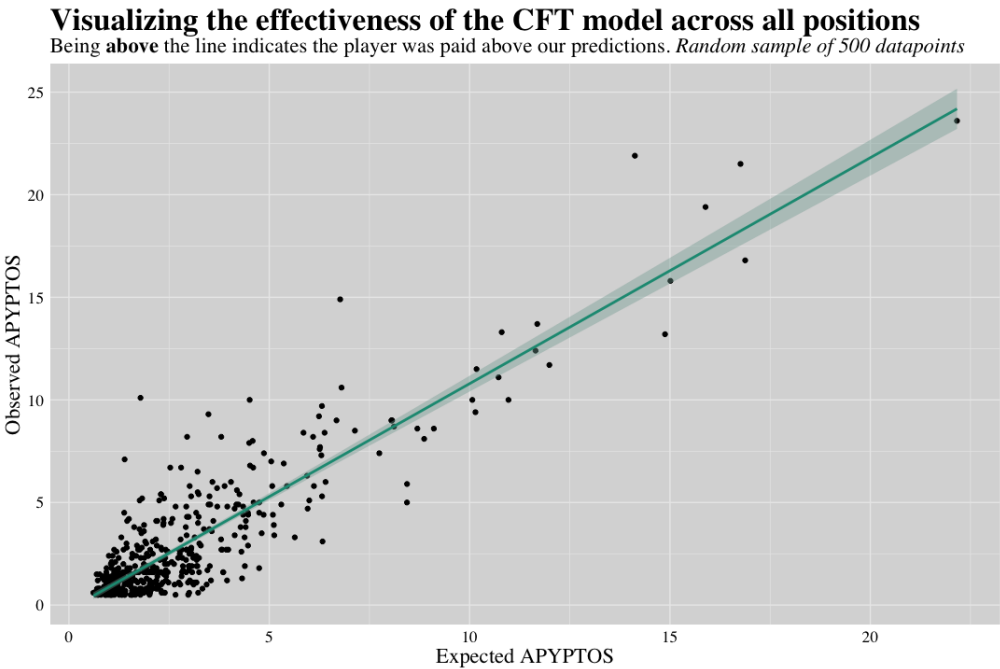


Fig. 7. Evaluating our model

As observed, there is a pretty strong linear correlation between the expected and observed contracts, emphasizing the effectiveness of our model. Factors like **AV** and **Age** were important in ensuring the model delivered an accurate result.

**Value over expected.** As displayed in the graph, there are some instances where the model's prediction varies from the player's actual contract. This would mean that despite statistics and age indicating that a player deserves a certain sum of money, a team might choose to either pay more or less than that amount. By taking the difference between the observed and expected APYPTOS, we can identify if a player was overpaid or underpaid. We can call this metric *Salary over Expected*, or SOE for short. SOE will be measured in the same units as APYPTOS. A positive SOE indicates a player was overpaid while a negative SOE indicates a player was underpaid. **Table 3** displays the 10 most **undervalued** contracts since 2016.

Player	Year	Team	Actual APYPTOS	Pred. APYPTOS	Difference (SOE)
Teddy Bridgewater	MIA	2022	3.10	11.86	-8.76
Tyrod Taylor	CLE/BUF	2017	9.10	17.70	-8.59
Chandler Jones	ARI	2016	2.10	9.00	-6.90
Teddy Bridgewater	CAR/DEN	2021	6.30	12.51	-6.21
Tyreek Hill	KC	2019	9.6	15.20	-5.60
Reuben Randle	PHI	2016	0.7	5.89	-5.19
Jameis Winston	NO	2020	0.6	5.67	-5.07
Ross Cockrell	PIT	2017	0.7	5.74	-5.04
Calais Campbell	MIA	2024	0.8	5.40	-4.60
Jakobi Meyers	NE	2022	1.9	6.48	-4.58

**Table 3. 10 most undervalued contracts**

To provide some context, take Calais Campbell (a 2024 contract) for example. The 2024 salary cap is 255.4 million dollars (15). Based on his prior production, the model expected Calais to make around 13.8 million dollars per year. The Dolphins signed him to a 1 year 2 million dollar deal - a bargain contract. A few of the above contracts belong to quarterbacks considered as backups, but were signed after starting the previous season or two. Since our statistics were mostly volume-based (and with only data from the last two years), it made sense why the model valued them higher than consensus. With that being said, players like Chandler Jones, Tyreek Hill, and Jakobi Meyers were well worth their contract. It is also worth noting that with the exception of Hill and Winston, all of these contracts would be considered middle class. Perhaps this is an indication that players in the middle class are getting paid less than what they deserve.

Are some positions especially undervalued? By averaging the SOE of every player at a given position, it is possible to answer this question. **Figure 8** displays the results.

Average SOE at each position	
Negative SOE indicates the position is undervalued	
Position	SOE
C	-0.061
CB	-0.063
EDGE	0.148
IDL	-0.070
OG	0.017
OT	0.044
QB	-0.059
RB	-0.121
SAF	-0.136
TE	0.067
WR	0.006

Fig. 8. SOE by position

Both running backs and safeties, traditionally lower-valued positions, are perhaps too undervalued, as they generate the smallest salary over expected. To provide context to the numbers, assuming the 2024 Salary Cap of 255.4 million, the average safety is making around **347 thousand dollars less** than they deserve annually and the average running back is making around **309 thousand less** than they deserve.

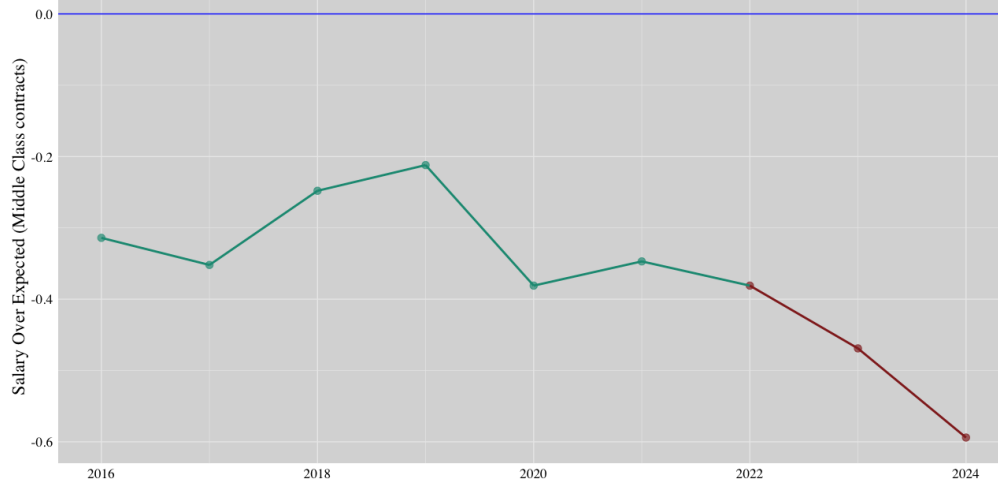
Is the sample from **Table 3** representative and is the middle class systematically undervalued? By taking the SOE of all middle class contracts and all non-middle class contracts, we can answer this question. **Figure 9** displays these results. The non-middle class contracts mostly belong to upper class players, since minimum deals were removed.

Is the middle class undervalued?	
It probably is!	
Class	SOE
Middle Class	-0.367
Not Middle Class	0.370

Fig. 9. SOE by class

Middle class contracts are indeed undervalued. On average, middle class players are getting significantly less than they deserve. How does this vary by year? Has the middle class been paid less over time? **Figure 10** displays the answer to this question.

**The middle class is experiencing unprecedented levels of *underpayment***  
Looking at the average SOE per year for middle class contracts



**Fig. 10.** Middle Class contracts by year

Indeed, the model has given an answer that aligns with our previous analysis. Not only is the middle class shrinking, players are getting paid less than they deserve. Sure players in the middle class have traditionally been underpaid. However, compared to the salaries prior to the 2020 CBA, the contracts signed in 2022, 2023, and 2024 are **disproportionately undervalued**. A middle class player who signed a contract in 2024 is making, on average, **1.5 million dollars** less than they deserve. This is a sobering reality that emphasizes the necessity of our solution.

## Conclusion

Under the new CBA, the middle class is decreasing and it is decreasing fast. Not only are there fewer contracts, but players are also getting paid less than their pedigree. This situation risks undermining the competitiveness of the league and negatively impacting the welfare of the players. However, the Veteran Salary Exception offers a potential solution. It allows teams to sign veteran players without the cap hit, making it possible to keep experienced talent while staying within budget. By pairing the VSE with our Contract Forecasting Tool, teams can identify the players who would benefit most from the exception, ensuring it is used effectively. The path forward is clear, and the stakes have never been higher.

1489	<b>References</b>	1551
1490	1. Witnauer, W. D., Rogers, R. G., and Saint Onge, J. M. (2007). <i>Major League Baseball Career Length in the Twentieth Century</i> . Population Research and Policy Review, 26, 371–386.	1552
1491	2. Keim, J. (2016). <i>With Average NFL Career 3.3 Years, Players Motivated to Complete MBA Program</i> . Retrieved from	1553
1492	<a href="https://www.espn.com/blog/nflnation/post/_id/207780/current-and-former-nfl-players-in-the-drivers-seat-after-completing-mba-program">https://www.espn.com/blog/nflnation/post/_id/207780/current-and-former-nfl-players-in-the-drivers-seat-after-completing-mba-program</a> .	1554
1493	3. Over The Cap. (2024). <i>Over The Cap</i> . Retrieved from <a href="https://overthecap.com/">https://overthecap.com/</a> .	1555
1494	4. Pro Football Reference. (2024). <i>Pro Football Reference</i> . Retrieved from <a href="https://www.pro-football-reference.com/">https://www.pro-football-reference.com/</a> .	1556
1495	5. GeeksforGeeks. (2024). <i>K Means Clustering – Introduction</i> . Retrieved from <a href="https://www.geeksforgeeks.org/k-means-clustering-introduction/">https://www.geeksforgeeks.org/k-means-clustering-introduction/</a> .	1557
1496	6. Venkatesh, A. (2024). <i>GitHub Repository – NFL Case Competition</i> . Retrieved from <a href="https://github.com/Atuav10/2024-NFLPA-case-competition">https://github.com/Atuav10/2024-NFLPA-case-competition</a> .	1558
1497	7. Kahler, K. (2022). <i>This NFL Draft Class Is Old</i> . Retrieved from <a href="https://defector.com/this-nfl-draft-class-is-old">https://defector.com/this-nfl-draft-class-is-old</a> .	1559
1498	8. Spotrac. (2024). <i>NFL Draft Tracker</i> . Retrieved from <a href="https://www.spotrac.com/nfl/draft/_/year/2025">https://www.spotrac.com/nfl/draft/_/year/2025</a> .	1560
1499	9. Wirth, T. (2024). <i>What ESPN Projects 49ers QB Purdy Could Land With Looming Extension</i> . Retrieved from	1561
1500	<a href="https://www.nbcsportsbayarea.com/nfl/san-francisco-49ers/brock-purdy-contract-extension-projection/1760109/">https://www.nbcsportsbayarea.com/nfl/san-francisco-49ers/brock-purdy-contract-extension-projection/1760109/</a> .	1562
1501	10. Graziano, D. (2020). <i>NFL CBA Approved: What Players Get in New Deal, How Expanded Playoffs and Schedule Will Work</i> . Retrieved from	1563
1502	<a href="https://www.espn.com/nfl/story/_id/28901832/nfl-cba-approved-players-get-new-deal-how-expanded-playoffs-schedule-work">https://www.espn.com/nfl/story/_id/28901832/nfl-cba-approved-players-get-new-deal-how-expanded-playoffs-schedule-work</a> .	1564
1503	11. Graziano, D. (2020). <i>Inside New NFL Roster Rules for 2020: Expanded Rosters, Practice Squad and Injured Reserve</i> . Retrieved from	1565
1504	<a href="https://www.espn.com/nfl/story/_id/29820641/inside-new-nfl-roster-rules-2020-expanded-rosters-practice-squad-injured-reserve">https://www.espn.com/nfl/story/_id/29820641/inside-new-nfl-roster-rules-2020-expanded-rosters-practice-squad-injured-reserve</a> .	1566
1505	12. NBA. (2024). <i>NBA Free Agency Explained</i> . Retrieved from <a href="https://www.nba.com/news/free-agency-explained">https://www.nba.com/news/free-agency-explained</a> .	1567
1506	13. Pro Football Reference. (n.d.). <i>Approximate Value</i> . Retrieved from <a href="https://www.pro-football-reference.com/about/approximate-value.htm">https://www.pro-football-reference.com/about/approximate-value.htm</a> .	1568
1507	14. University of Virginia. (n.d.). <i>Understanding Empirical Cumulative Distribution Functions</i> . Retrieved from	1569
1508	<a href="https://library.virginia.edu/data/articles/understanding-empirical-cumulative-distribution-functions">https://library.virginia.edu/data/articles/understanding-empirical-cumulative-distribution-functions</a> .	1570
1509	15. NFL Operations. (2024). <i>NFL Announces 2024 Salary Cap</i> . Retrieved from	1571
1510	<a href="https://operations.nfl.com/updates/football-ops/nfl-announces-2024-salary-cap/#:~:text=%E2%80%8BThe%20NFL%20announced%20today">https://operations.nfl.com/updates/football-ops/nfl-announces-2024-salary-cap/#:~:text=%E2%80%8BThe%20NFL%20announced%20today</a> .	1572
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